

Bovey basin was occupied by an inland lake. The entire absence of freshwater shells, and, indeed, of aquatic animals generally, is certainly very extraordinary, and so is the absence of fruits of the *Chara*, so abundant elsewhere in miocene freshwater deposits; the *Nymphæa* seeds, however, furnish a secure indication of fresh water. We must not omit to notice that the parts of the basin hitherto explored were towards the middle of the lake, and, in the case of the under beds at least, at a considerable depth, which explains the absence of bog-plants as well as of mammalian relics.

The lignite beds consist almost entirely of tree-stems (probably belonging in great measure to *Sequoia Couttsiæ*) which have apparently been floated hither, not only from the circuit of the immediate hills, but doubtless also from greater distances.

The twenty-sixth bed in the series, immediately above the "thick bed of sand," is a soft clay with numerous leaves of plants, and ripe cones and seeds of *Sequoia Couttsiæ*; the bed was probably formed in autumn, and the plants it contains are due to the driftings of that season. Higher up follows the bed (twenty-five) with fern rhizomes, and occasionally pinnules of *Pecopteris lignitum*. The latter appears in great abundance with branches of *Sequoia* still higher.

As this under miocene formation is immediately succeeded by that of the gravel and white clay, we have here a great hiatus: either the middle and upper miocene, as well as the pliocene, periods must have passed without the formation of deposits in this place, or they must have been removed again in the diluvial period.

B. The White Clay.

While the lignites and their alternating clays present us with a subtropical vegetation, the plants of the White Clay exhibit a totally different character, and must have had their origin in an altogether distinct period.

Four species—three of *Salix* and one of *Betula*—have been found in this overlying mass, no one of which appears to differ from species now living. The presence of the *Betula* (*B. nana*) is conclusive for a diluvial climate, that is, a colder climate than Devonshire has at the present day; for this dwarf birch is an Arctic plant, which has no British habitat south of Scotland, and which occurs in Mid Europe only on mountains and sub-alpine peat mosses. The evidence of the willow-leaves is to the same effect, indicating that at this period Bovey Heathfield was a cold peat-moor.

ZOOLOGICAL SOCIETY.

June 25, 1861.—Dr. J. E. Gray, F.R.S., V.P., in the Chair.

NOTES ON THE SEA-ANEMONES OF MADEIRA, WITH DESCRIPTIONS OF NEW SPECIES. BY JAMES YATE JOHNSON.

In the following notes I have given an account of such Sea-Anemones as have occurred to me after much diligent search in the neighbourhood of Funchal, the capital of Madeira. The dredge

would doubtless bring other species to light, and possibly something additional would be discovered by an examination of the shore in other parts of the island. As to the nomenclature of the genera, I have considered it right to follow Mr. Gosse, to whom all students of this tribe of Zoophytes must feel much indebted for his painstaking book on the British species.

A *Cornularia* is included ; for although not, strictly speaking, a Sea-Anemone, it closely resembles one in external appearance.

Order ALCYONARIA, M.-Edw.

CORNULARIA ATLANTICA, sp. n.

Basal band narrow, inconspicuous, creeping irregularly, and bearing the polypes at uncertain distances. Column of a pale flesh-colour, subcylindrical, rather wider at the middle than above and below ; destitute of spicula, but invested by a thin epidermis containing particles of sand ; when retracted, forming a fleshy hemispherical button, one-fifteenth of an inch high ; when expanded, the column has a length of about three-tenths of an inch, with a diameter of one-twelfth of an inch. Eight pinnate tentacles, in one series, at the margin of the shallow cup forming the disk, the pinnæ of about twelve pairs, ringed, as if showing a tendency to further division. Tentacle-stem subulate, about one-fourth of an inch in length, the bases of the tentacles broadening and coming in contact one with another on each side. When the animal is fully displayed, the tentacles and the upper part of the column are nearly colourless, and have the appearance of a transparent film.

Abundant on stones near low-tide mark ; sometimes attached to sea-weed.

Order ZOANTHARIA, M.-Edw.

Suborder ACTINIARIA, M.-Edw.

Fam. ACTINIIDÆ, M.-Edw.

SAGARTIA PARASITICA, R. Q. Couch, sp.

This species is invariably seated upon shells inhabited by Hermit Crabs, *Cassia sulcosa*, *Dolium perdis*, *Triton nodiferus*, &c.

SAGARTIA AFFINIS, sp. n.

This species is closely allied to the last, and like it is always found upon shells of which Hermit Crabs have taken possession, sometimes in company with it, sometimes alone. Its base is capable of great extension ; and its column rises pillar-like, of a diameter very much less than that of the base. When contracted it will often lie so flat as to be scarcely thicker than a sixpence. The ground-colour of the column is yellow ; and there are five broad, more or less fuscous longitudinal bands, which, when the body is contracted, lie star-like upon it. Sometimes there is an irregular whitish transverse band placed nearer the disk than the base ; and in some specimens a number of white longitudinal streaks have been observed near the base. The inside of the mouth is orange. The disk itself is yellowish, the tentacles grey, numerous, in four or five rows. The

average size of this species is less than that of *S. parasitica*, the largest specimens of which I have never seen equalled by any of *S. affinis*. Near neighbours in habit and mode of life as these two may be, I have never observed any passage from one form to the other, although a good many specimens have been met with. It is an eager and voracious feeder, and bears captivity very well. It will sometimes transfer itself from the shell to the bottom of the tank, and after a while, lo! it is seated on the shell once more, the shell being all the time the abode of a restless *Pagurus*.

PHELLIA VESTITA, sp. n.

Base adherent to rocks, less than column. Column cylindrical when expanded, clothed with a dense, brown, closely-adherent skin, rough like wash-leather, which when forcibly stripped off discloses the true skin beneath, which is smooth and of a pinky red. The animal is able to protrude the lower part and the upper part of its column from beneath the epidermal covering, which seems to consist chiefly of mucus and fine mud blended together. In a contracted state it is wrinkled transversely, but not warted. Disk smooth, reddish, with radiating marks of brown and white. Tentacles numerous, in three rows, crowded near margin of disk, of moderate length, the innermost row the longest; retractile, conical, rather broad at the base, pale red, more or less ringed and spotted with opaque white: sometimes the dilated bases have a dark neutral-tint band, and below this a white band round them. Mouth not raised on a cone, but sometimes puffed out. Acontia emitted sparingly.

This Sea-anemone is able to take considerable variety of shape; sometimes it is contracted, sometimes swollen out at the middle, and when irritated into a state of complete contraction, it has a very rugose appearance. When detached from any support, I have seen it contract its base so much that a small hole only was visible. It has the power of expanding or distending both the lower and upper parts of its body, the expanded portions becoming semitransparent, and assuming the appearance of bladders, whilst the rest of the column retains its rough opaque coating. This coat adheres so strongly, that I have in vain endeavoured to remove it with my finger-nail from a healthy animal. From a specimen, however, which had been severely wounded in removing it from its native rock, I succeeded in peeling off the coat in patches. The animal is not timid, it will keep its tentacles expanded until it is touched; but in the day-time it seldom pushes them out to their full stretch; they are usually held curved over the margin of the disk. It is rather fond of ascending the side of the tank until it nearly reaches the surface of the water; then, attaching itself by part of its lower disk, it will bend its body loosely downwards at an angle of 45°. It is hardy in the aquarium, rather sluggish in its habits, and adheres firmly to its support. It is not uncommon under stones in pools amongst the rocks covered at high tide. The size is not great; the largest I have seen measured about half an inch in height when contracted, and expanded to a length of about an inch and a half.

AIPTASIA COUCHII, W. P. Cocks, sp.

Not very common : usually found under loose stones near the level of low tide. It preserves at Madeira all the chief characters and habits possessed by its British sisters—restlessness of disposition, flexuosity of tentacles, power of lengthening and contracting the column, love of attaching itself to the side of the tank near the surface of the water, the column hanging downwards with the disk and tentacles widely expanded ; lastly, eagerness in seizing and swallowing its food. Sometimes it will abandon all support and suspend itself freely in the water, base uppermost, remaining thus for several hours without moving, save in being continually employed in distending the column laterally. The distention began to show itself at the disk, and travelled slowly along until it reached the base ; when this had been effected, the animal stretched itself out and then recommenced the operation. One of my specimens, now living in a glass of sea-water, presented itself one day as a globular vesicle three-quarters of an inch in diameter. The disk and tentacles had been retracted, and the tips of some of the latter were just visible at the bottom of a depression resembling that seen at the top of an apple.

ANTHEA CEREUS, Johnston.

This species is by far the most abundant of the Madeiran *Actinaria*, being found in almost every pool on the rocks between tide-marks. It is undoubtedly the animal described in Dana's great work under the name of *Actinia flagellifera* (*Comactis flagellifera*, M.-Edw.).

ACTINIA MESEMBRYANTHEMUM, Ellis & Sol.

This species stands next in regard to abundance. The commonest variety is coloured a red-purple, with numerous black dots on the column. Sometimes the spots are greenish grey, sometimes the marginal spherulæ are red-purple instead of being azure. The animal is frequently of an umber-brown ; and a few specimens have occurred which had a brown body and disk, with red-purple base and tentacles. Two specimens have been met with which had a dull-green body and tentacles, with a white base, blue marginal spherules, and a blue line at the junction of the column with the base. At the time I possessed these two *Actiniae* a third specimen was obtained, slightly different from them ; and this was placed in the same glass. On looking at them after the lapse of a few hours, I found that the new comer was in contact with one of the others, and that six of the marginal spherules of the latter on the side of contact had expanded into large, colourless, ovate vesicles, retaining only their original blue colour at the tips. The upper part of the body of the animal was separated at this time from the tentacle-bearing disk by a deep fosse. Subsequently more of the blue tubercles expanded, until ten in this state were counted ; after a while the disk expanded laterally, the vesicles contracted, and the fosse disappeared. Whilst the vesicles existed, the tentacles in their neighbourhood became much reduced in diameter, so as to be filiform. I am not aware whether a similar phenomenon has been observed by others.

ACTINIA VIRGATA, sp. n.

Base of a deep flesh-colour, adherent to stones, not much exceeding the column when the tentacles are expanded; when these are withdrawn and the column is depressed, it frequently spreads out into an enlarged irregular oval. Column delicately smooth, imperforate, non-adhesive; substance fleshy, marked by numerous (45 to 50) pairs of straight, purplish-blue lines, which extend from the margin of the disk to the angle of the column and base, where there is a circumferent line of the same colour. Each of these lines is about half as wide as the space between any two; sometimes a line is broken up into dots. When the animal is in a contracted state, the lines are brought so close together, and their colour so deepened, that it appears nearly black. The disk has the margin closely set with azure tubercles, about thirty in number; it is smooth, of a pinkish flesh-colour, often puffed out into a cone, at the top of which is the mouth. Tentacles about eighty in number, crowded in three or four rows, placed near the margin of the disk, moderately long, with little difference between dimensions of those in the several series, conical, of a pale-brown colour, with a slight purple tinge. When contracted, of a dark sepia-brown. Mouth with an azure-blue spot at the opposite angles. Acontia, none observed.

Size from half to three-quarters of an inch in height, and from one-third to one-half an inch in height.

Found on the underside of stones in pools near low water-mark.

This pretty species is not very common: it is of very quiet habits, and dislikes the light. When in the aquarium it hardly ever expands its tentacles in the day-time, and at night, if brought within the influence of light, the animal immediately takes alarm. A specimen is now living in one of my tanks. A few days ago, on looking at it after an interval of four or five hours, I found, to my surprise, that it had in the meantime surrounded itself with a progeny of fourteen young ones, the average size of which was one-tenth of an inch in height and diameter, though some were smaller and some nearly twice as large. They were of a dull flesh-colour; but on the larger ones the purplish-blue marks began, in the course of a few hours, to show themselves as rows of dots, with irregularly arranged dots filling up the spaces between the rows of each pair. Some of them displayed their tiny tentacles in a ludicrously old-fashioned manner. As to the mother, she had contracted her tentacles until they were little more than papillæ; the disk was puffed out much beyond their tips; and the mouth was gaping widely, displaying a red throat; the base was quite free, and was altogether concealed by the contraction of the body.

BUNODES LISTERI, sp. n.

Base adherent to rocks; its diameter about equal to the height of the column. Column, when expanded, usually from half to three-quarters of an inch in height; but one specimen extended itself to the length of an inch and a third, with a diameter of four-tenths of an inch. Surface red, beset with longitudinal rows, about twenty-

four in number, of small white tubercles, which have a spot or streak of red at their apices. There are from ten to sixteen tubercles (taking different specimens) in a row; these tubercles can be employed as suckers, and by them I have seen the animal adhere to the bottom or side of a glass in which it was living; the alternate rows sometimes cease with the third or fourth from the disk. Disk frequently cup-like, without marginal spherules, very transparent, with a row of small white spots at the inner base of the innermost series of tentacles: sometimes there are white spots between the tentacles. Margin of disk uneven, by reason of the highest tubercles of the column forming part of the outline. Mouth with a pale ring around it. Tentacles numerous, in about three rows near the margin of the disk, those of the innermost row longer, and these are as long as the diameter of the column, decreasing in size outwards, pale flesh or brown, but sometimes bearing white opaque spots, very pellucid, conical, simple, readily retractile, and usually brown, curled at the tips.

This pretty species is very distinct from all the other Madeiran species that have occurred, but it seems to be closely allied to the British *Bunodes Ballii*. The pale-red, diaphanous tentacles become in some cases, when contracted, of a red-purple colour, in others of a brown hue. In one specimen, which was brought to me much wounded, the red tubercles of the column were ringed with greenish yellow. The animal is rather impatient of light, and is only seen fully expanded at night. It adheres very firmly to the object it is seated upon, and will submit to be torn rather than loosen its hold.

I have named this species in honour of Dr. N. Lister, of Funchal, to whom I am indebted for much sympathy and assistance in my investigations.

ALICIA, gen. n.

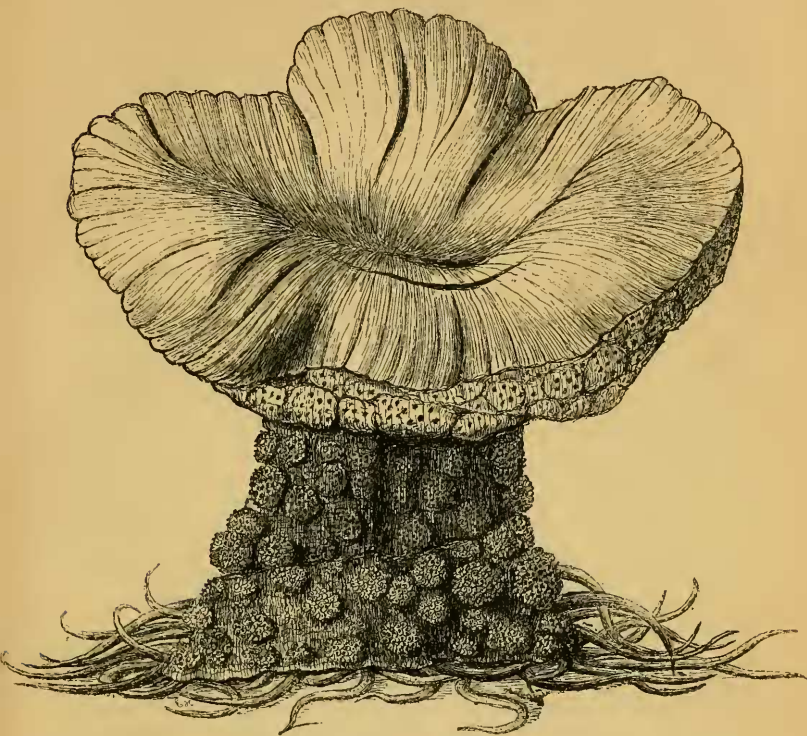
Base adherent at pleasure; greatly exceeding column. Tentacles simple. Margin of disk simple, without spherules. *Column beset with stalked appendages.*

ALICIA MIRABILIS.

Base pale brown, adherent apparently by means of minute round suckers scattered over it, capable of great dilatation, and sometimes having a diameter of between 4 and 5 inches; very transparent, so that the appendages on the column could be seen through it. The outline undulate; the surface marked with about a hundred radiating furrows, meeting in the middle, and causing the margin to be crenate. Column apparently imperforate, pillar-like, when fully expanded measuring $2\frac{1}{2}$ inches in height and diameter; surface delicately soft, pellucid, pale brown, marked with longitudinal furrows corresponding with those on the base; beset with stalked appendages. At the base these appendages are small, nearly sessile, and bear at their summits a single wart of hemispherical outline and of a dull-purple hue; they become larger in proportion to their height above the base, until those next the oral disk have stalks half an inch high and $\frac{3}{10}$ of an inch in diameter, which divide and redivide, each ultimate division always crowned with a wart. As many as sixty warts

might be counted on one of these appendages, the appearance of which when half-contracted, had some resemblance to a head of cauliflower. In most cases the common stalk was of an opake white colour, but

1



4



2



3

Fig. 1. *Alicia mirabilis*, as seen with the base detached and uppermost, the tentacles lying on the bottom of the tank.

Figs. 2 and 3. Two of the appendages of the column, of the natural size.

Fig. 4. One of the warts of an appendage, enlarged. The outer coat is colourless and transparent; the top of the interior body is dull purplish, the lower part yellowish brown, and the interspace colourless.

in other cases it was orange; and there were two of this colour standing higher up the column than the rest, and placed over against each other. When the animal was in its state of greatest contrac-

tion, no part of the column was visible, on account of the warted tops of the appendages forming an unbroken coat; when fully expanded, the soft delicate body was seen between the separated appendages, and the upper part near the disk was extended quite clear of them for a considerable space. Under the microscope the purple warts were seen to consist of an exterior, transparent, colourless coat enveloping a body which was purplish at the tip and pale brown below. Disk destitute of marginal spherules, not lobed nor extending beyond the column, pale brown, transparent, slightly cupped. Tentacles pale brown, simple, subulate, elongated, rather slender, often curled, numerous, compactly set in three rows near the margin of the disk, beset with minute papillæ. Mouth half an inch across; lips usually somewhat puffed out, and divided by deep furrows into six longitudinal ribs on each side; destitute of warts and tentacles. Throat of a pretty full brown. No acontia observed.

But one specimen of this very curious animal has occurred; it was brought to me alive in the month of April last, and was said to have been found in one of the cane-work baskets which are sunk to the depth of a few fathoms in the Bay of Funchal, chiefly for the purpose of taking red mullet (*Mullus surmuletus*, L., and *M. barbatus*, L.). When I first saw it, only just covered with a little water, it was in a contracted state, and my first impression was that a compound Ascidian was before me. After keeping it for three weeks in a small tank, I attempted to bring it with me to England in order to show it to those interested in this tribe of animals; but being unfortunately unable to attend to it in the earlier part of my voyage, it perished, to my great regret.

As to its habits during the time it lived in my tank, I may say, that it bore confinement very well, and took its food (the flesh of *Patellæ*) with considerable readiness. It frequently shifted its position in the tank, and on one occasion it was seen floating base uppermost; when attached, its upper part was seldom destitute of motion, but that motion was exceedingly slow. The tentacles were usually more or less displayed; but it has been observed with them so completely withdrawn that it was not easy to discover the precise situation of the disk and mouth. The tentacles possessed the power of stinging; but, though the skin was made red, the pain was not great.

Fam. CERIANTHIDÆ, M.-Edw.

SACCANTHUS MADERENSIS, sp. n.

Column lengthened, worm-like, with a conical *imperforate* base; skin smooth, apparently without suckers or loopholes; of a pale chestnut-brown colour; enveloped in a loose non-adherent tube secreted by the animal, open at both ends. Disk without marginal spherules, cup-shaped, capable of being expanded so as to have a diameter twice as great as that of the column. Tentacles of two kinds: 1st, marginal, twenty-four in number, in one series, but often arranged, when fully displayed (and then bending inwards and outwards alternately), so as to have the appearance of being placed in two rows; these tentacles are slender, tapering, uniform, longer

than the diameter of the column, and are coloured brown with pale rings: 2nd, short filiform tentacles, about twenty-five in number, arranged in two or three irregular circles round the mouth, coloured a uniform brown; these labial tentacles hardly equal in length the radius of the disk.

Only one specimen of this interesting animal has fallen in my way. When first brought to me, its appearance was that of a mass of dirt which had a certain convoluted shape, and out of which protruded at one place a reddish semitransparent body (the base), and at another some tentacles, which partly folded up on being touched. At first sight I took the animal for an Annelid; but during the night it shuffled off its muddy coating and displayed itself in its true character. It was then seen to have a length of about $2\frac{1}{2}$ inches, with a diameter of about a quarter of an inch. The column was quite smooth, cylindrical, and of a brown colour approaching to auburn or chestnut. When examined with a lens, some fine longitudinal lines were perceived, dividing the body at regular intervals, and being about $\frac{1}{16}$ of an inch apart. Faint angular transverse lines were also visible, pretty closely set. It seemed shy, and never expanded its tentacles completely, except in the dark, when it contracted them if the light of a candle fell upon it. The power of fully withdrawing them seemed to be wanting. They were more than an inch in length when entirely displayed. The next day I perceived it lying in the angle at the bottom of the glass containing sea-water, enveloped in a glaucous semitransparent film of mucus looking like a stout spider's web, in which it moved as a worm moves in its case. It had expanded to a length of $4\frac{1}{2}$ inches, but on being touched immediately contracted so as to measure only $1\frac{3}{4}$ inch. It possessed the power of swelling out portions of the column; sometimes the swelling appeared near the middle of the body; sometimes near the base. On some occasions it lay with the lower part of the body bent into a hook; at others it quitted the protection of its tube and floated at the surface of the water. The animal was never observed to wriggle or glide through the water like a worm; all its motions were extremely slow. It was captured at the bottom of a pool in the rocks near Funchal.

MISCELLANEOUS.

Note on Physa acuta (Draparnaud).

By the Rev. ALFRED MERLE NORMAN, M.A.

To the Editors of the Annals of Natural History.

GENTLEMEN,—In February last I described in your Journal the well-known European Mollusk, *Physa acuta* (Draparnaud) as having been met with in our Islands. It was mentioned in my paper that the species had been found in a tank at Kew Gardens, and also in "a ditch in the immediate vicinity of London." This last locality was a "brook near the Hampton Wick entrance to Bushy Park;" and the species was presumed by Mr. Choules to have been introduced from this habitat, along with water-plants, into Kew Gardens.

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